

Amendments (including status) of the Claims

Claim 1. (Previously Amended) A semiconductor module, comprising:

a wiring substrate on which wiring is formed;

a semiconductor device mounted on said wiring substrate and electrically connected to said wiring;

an external connection terminal electrically connected to said wiring, said external connection terminal arranged on a same side of said wiring substrate to which said semiconductor device is mounted; and

an insulating resin layer, said insulating resin layer having a thickness greater than said semiconductor device, provided between said wiring substrate and said external connection terminal and functioning to relax stress between said semiconductor module and a board to which the semiconductor module is mounted.

Claim 2. (Currently Amended) A semiconductor module, comprising:

a wiring substrate on which wiring is formed;

a semiconductor device mounted on said wiring substrate and electrically connected to said wiring;

an external connection terminal electrically connected to said wiring, said external connection terminal arranged on a same side of said wiring substrate to which said semiconductor device is mounted; and

an insulating resin layer formed on the same side of said wiring substrate to which said semiconductor device is mounted,

wherein said insulating resin layer has an inclined portion and a flat portion on which said external connection terminal is arranged, said insulating resin layer functioning to relax stress between said semiconductor module and a board to which said semiconductor module is mounted, and

wherein a part of said wiring electrically connected between a terminal on said semiconductor device and said external connection terminal is formed on said inclined portion of said insulating resin layer.

Claim 3. (Original) A semiconductor module according to claim 1 or claim 2, wherein said insulating resin layer is formed by mask printing.

Claim 4. (Currently Amended) A semiconductor module, comprising:

a wiring substrate on which wiring is formed;

a semiconductor device mounted on said wiring substrate and electrically connected to said wiring;

an insulating resin layer having a function of relaxing stress, between said semiconductor module and a board to which said semiconductor module is mounted; and

an external connection terminal on said insulating resin layer and electrically connected to said wiring,

wherein said insulating resin layer is one of a plurality of said insulating resin layers that are collectively formed on a same side of said wiring substrate to which said semiconductor device is mounted by printing insulating material with a mask on a board comprising a plurality of said wiring substrates.

Claim 5. (Previously Amended) A semiconductor module according to claim 1 or claim 2, wherein said insulating resin layer substantially encloses said semiconductor device.

Claim 6. (Original) A semiconductor module according to claim 5, wherein said insulating resin layer is frame-shaped.

Claim 7. (Previously Amended) A semiconductor module according to claim 5, wherein an inclination of an inner circumferential side is relatively gradual to that of an outer circumferential side of said insulating resin layer.

Claim 8. (Original) A semiconductor module according to claim 1, wherein a plurality of insulating resin layers are used instead of said insulating resin layer and arranged as if they enclose said semiconductor device.

Claim 9. (Original) A semiconductor module according to claim 1, wherein said wiring substrate is a silicon substrate or a glass substrate.

Claim 10. (Previously Amended) A semiconductor module according to claim 1, wherein said insulating resin layer is made of insulating material having an elastic modulus from within the range of approx. 0.1Gpa to approx. 10Gpa.

Claim 11. (Original) A semiconductor module according to claim 1, wherein a film thickness of said insulating resin layer is approx. 10 μ m to approx. 350 μ m.

Claim 12. (Previously Amended) A semiconductor module according to claim 1, wherein said semiconductor device is one of a semiconductor chip, a chip scale package (CSP), a ball grid array (BGA), and an wafer-level CSP.

Claim 13. (Original) A semiconductor module according to claim 1, wherein a sum of a thickness of said insulating resin layer and a height of said external connection terminal is greater than a distance from the mounted surface of said semiconductor device to a rear surface thereof.

Claim 14. (Previously Amended) A semiconductor module according to claim 1, wherein a sum of a thickness of said insulating resin layer and a height of said external connection terminal is substantially equal to a distance from the mounted surface of said semiconductor device to the rear surface thereof.

Claim 15. (Previously Amended) A semiconductor module, comprising:

a wiring substrate on which wiring is formed;

a semiconductor device electrically connected to said wiring on said wiring substrate via a bump of said semiconductor device;

an external connection terminal electrically connected to said wiring, said external connection terminal arranged on a same side of said wiring substrate to which said semiconductor device is mounted; and

an insulating resin layer formed on the same side of said wiring substrate on which said semiconductor device is mounted,

wherein said insulating resin layer has a function of relaxing stress between said semiconductor module and a board to which said semiconductor module is mounted, and

wherein said wiring substrate is a silicon substrate.

Claim 16. (Currently Amended) A semiconductor module, comprising:

a wiring substrate on which wiring is formed;

a semiconductor device electrically connected to the wiring on a side
of said wiring substrate via a bump of said semiconductor device;

an external connection terminal electrically connected to said wiring,
said external connection terminal arranged on a same side of said wiring substrate
to which said semiconductor device is mounted; and

wherein said semiconductor device has an insulating resin layer
having a function of relaxing stress between said semiconductor device and said
wiring substrate to which said semiconductor device is mounted, said
semiconductor device being mounted on said wiring substrate without using an
underfill.

Claim 17. (Currently Amended) A semiconductor module, comprising:

a wiring substrate on which wiring is formed;

a semiconductor device electrically connected to the wiring on a side
of said wiring substrate via a bump of said semiconductor device;

an external connection terminal electrically connected to said wiring,
said external connection terminal arranged on a same side of said wiring substrate
to which said semiconductor device is mounted;

a first insulating resin layer formed on the same side of said wiring
substrate to which said semiconductor device is mounted, said first insulating resin
layer having a function of relaxing stress between said semiconductor module and a
board to which said semiconductor module is mounted; and

wherein said semiconductor device has a second insulating resin layer
having a function of relaxing the stress between said semiconductor device and said
wiring substrate to which said semiconductor device is mounted, said
semiconductor device being mounted on said wiring substrate without using an

underfill.

Claim 18. (Previously Amended) A semiconductor module according to claim 16, wherein said insulating resin layer is made of an insulating material having an elastic modulus from within the range of approx. 0.1Gpa to approx. 10Gpa.

Claim 19. (Original) A semiconductor module according to claim 16, wherein a film thickness of said insulating resin layer is approx. 10 μ m to approx. 350 μ m.

Claim 20. (Original) A semiconductor module according to claim 16, wherein said insulating resin layer is formed by mask printing.

Claim 21. (Previously Amended) A semiconductor module according to claim 16, wherein said external connection terminal is formed on a second insulating resin layer, which is formed on said semiconductor device mounted side of said wiring substrate, having an inclined portion at a given inclination to the mounting surface and a substantially plane flat portion on which said external connection terminal is arranged.

Claim 22. (Withdrawn)

Claim 23. (Previously Amended) A mounting structure comprising a semiconductor module, a heat conductive material and an external substrate to which said semiconductor module is mounted,

wherein said semiconductor module includes:

a wiring substrate on which wiring is formed;

a semiconductor device mounted on said wiring substrate and electrically connected to said wiring;

an external connection terminal electrically connected to said wiring, said external connection terminal arranged on a same side of said wiring substrate to which said semiconductor device is mounted; and

an insulating resin layer, said insulating resin layer having a thickness greater than said semiconductor device, provided between said wiring substrate and said external connection terminal and functioning to relax stress between said semiconductor module and a board to which the semiconductor module is mounted, and

wherein said heat conductive material layer is formed on said external substrate to which said semiconductor module is mounted and said semiconductor device of said semiconductor module is connected to said heat conductive material layer.

Claim 24. (Previously Amended) A semiconductor module according to claim 1, further comprising a metal member connecting said semiconductor device to a circuit board.

Claim 25. (Original) A semiconductor module according to claim 1, wherein said semiconductor device is connected to said wiring substrate by die-attaching and said semiconductor device is electrically connected to the wiring formed on said wiring substrate by wire bonding.

Claim 26. (Previously Amended) A semiconductor module, comprises:

a wire substrate on which wiring is formed;

a semiconductor device electrically connected to the wiring formed on said wiring substrate;

an insulating material covering said semiconductor device; and

an external connection electrode for enabling electrical connection between wiring formed on said insulating material and that located external to said semiconductor module.

Claim 27. (Currently Amended) A semiconductor module according to claim 26, wherein there is provided an intermediate plate in the said insulating material between said semiconductor device and said external connection terminal.

Claims 28 and 29. (Canceled)

Claim 30. (New) A semiconductor module, comprising:

a wiring substrate on which wiring is formed;

a semiconductor device mounted on said wiring substrate and electrically connected to said wiring;

an insulating resin layer having a function of relaxing stress between said semiconductor module and a board to which said semiconductor module is mounted; and

an external connection terminal on said insulating resin layer and electrically connected via said wiring to a terminal of said semiconductor device,

wherein said insulating resin layer is one of a plurality of such insulating resin layers that are collectively molded on a board comprising a plurality of said wiring substrates, each said insulating resin layer has a thickness greater than said semiconductor device between said wiring substrate and said external

connection terminal.

Claim 31. (New) A semiconductor module according to claim 30, wherein each said insulating resin layer is formed on an outer peripheral portion of a separate said wiring substrate.